Application Serial No: 10/679,686
In reply to Office Action of 21 January 2005

Attorney Docket No. 83996

AMENDMENTS TO THE SPECIFICATION

Amend the paragraph beginning at page 7, line 3 and ending at page 7, line 18 as follows:

U.S. Patent No. 6,397,234 B1, issued May 28, 2002, to O'Brien, Jr. et al., discloses a method and apparatus for automatically characterizing the spatial arrangement among the data points of a time series distribution in a data processing system wherein the classification of ~~said~~ this time series distribution is required. The method and apparatus utilize a grid in Cartesian coordinates to determine (1) the number of cells in the grid containing at least-one input data point of the time series distribution; (2) the expected number of cells which would contain at least one data point in a random distribution in said grid; and (3) an upper and lower probability of false alarm above and below said expected value utilizing a discrete binomial probability relationship in order to analyze the randomness characteristic of the input time series distribution. A labeling device also is provided to label the time series distribution as either random or nonrandom, and/or random or nonrandom.

Amend the paragraph beginning at page 10, line 10 and ending at page 11, line 3 as follows:

A first stage characterization of the spatial arrangement of the first three-dimensional time series distribution of the data points may comprise the steps of determining a statistically expected proportion Θ of the plurality k of three-dimensional volumes containing at least one of the data points for a random distribution of the data points such that $k * \Theta$ is a statistically expected number M of the plurality k of three-dimensional volumes which contain at least one of the data points if the first three-dimensional time series distribution is characterized as random. Other steps may comprise counting a number m of the plurality k of three-dimensional volumes which actually contain at least one of the data points in the first three-dimensional time series distribution in any particular sample. The method comprises statistically determining an upper random boundary greater than M and a lower random ~~barrier~~ <u>boundary</u> less than M such that if the number m is between the upper random ~~barrier~~ <u>boundary</u> and the lower random ~~barrier~~ <u>boundary</u> then the first time series distribution is characterized as random in structure during the first stage characterization.

Amend the five paragraphs beginning at page 16, line 3 and ending at page 16, line 18 as follows:

FIG. 1 is a hypothetical depiction in Cartesian coordinates of a representative white noise (random) time series signal distribution in accordance with prior art;

FIG. 2 is a hypothetical illustrative representation of a virtual volume in accordance with ~~the invention~~ prior art divided into a grid of cubic cells each having a side of length δ , and an area of δ^3;

FIG. 3 is a block diagram representatively illustrating the method steps of the invention;

FIG. 4 is a block diagram representatively illustrating an apparatus in accordance with ~~the invention~~ prior art; and

FIG. 5 is a table showing an illustrative set of discrete binomial probabilities for the randomness of each possible number of occupied cells of a particular time series distribution within a specific probability of false alarm rate of the expected randomness number in accordance with prior art.

Insert the following paragraph ending at page 32, line 14 and before the paragraph beginning at page 32, line 15 as follows:

Steps 110, 112, 114, 116, 118, 120 and 122 comprise the hereinearlier referred to first stage characterization process, hereby designed by the reference character 122a (only FIG. 3).

Amend the paragraph beginning at page 32, line 15 and ending at page 33, line 8 as follows:

Branching to step 123 (FIG. 3) which the sparse data decision logic module performs, the R statistic value of 0.94 is evaluated statistically. A more precise indicator is obtained by applying the significance test in accord with the present invention, as described earlier. For this calculation, we note that θ = .632, which invokes the Binomial probability model to test the hypothesis:

$$H_0 : \mu = k6(NOISE)$$
$$H_1 : \mu = k\theta(SIGNAL)$$

In this case, $k\theta$ = 18.96. Thus, applying the Binomial test gives:

$$Z_B = \frac{m \pm c - k6}{\sqrt{k\theta(1-\theta)}}$$

$$= \frac{18 - .5 - 18.96}{\sqrt{30(.632)(1-.632)}} \approx -.55$$

The p value is computed to be:

$$p = P(|z_B| \le Z) = 1 - \frac{1}{\sqrt{2\pi}} \int_{-|-.43|}^{+|-.43|} \exp(-.5x^2)dx = .58$$

Since p = .58 and $\alpha = 0.1$, and since $p \ge \alpha$, we conclude <u>(step 124)</u> that the R test shows the volumetric data to be random (NOISE only, with 99% certainty) with the value of R= .93 computed for this spatial distribution in 3D-space.

Amend the paragraph beginning at page 33, line 15 and ending at page 34, line 7 as follows:

Since m = 18 falls inside of the critical region, i.e., $m_1 \le 18 \le m_2$, the decision is that the data represent an essentially white noise distribution (step 126). <u>Steps 123, 124, and 126 comprise the hereinearlier referred to second stage characterization process, hereby designated by the reference numeral 127 (only FIG. 3).</u> Accordingly, since both methods yield consistent results the distribution is labeled at step 128 by the labeling device 26 as a noise distribution, and

transferred back to the data processing system 10 for further [illegible] processing. In the naval sonar situation having a spatial component, a signal distribution labeled as white noise would be discarded by the processing system, but in some situations a further analysis of the white noise nature of the distribution would be possible. Similarly, the invention is contemplated to be useful as an improvement on systems that look for patterns and correlations among data points. For example, overlapping time series distributions might be analyzed in order to determine where a meaningful signal begins and ends.